

## Claims

What is claimed is:

1. An atom probe comprising:
  - a. a specimen mount whereupon a specimen to be analyzed may be situated;
  - b. a detector spaced from the specimen mount;
  - c. a local electrode situated between the specimen mount and detector;
  - d. a filtering electrode situated between the local electrode and the detector;wherein:
  - (1) the local electrode and the detector are each charged to a potential with respect to the specimen mount whereby ions from any specimen provided on the specimen mount are attracted towards the local electrode and the detector, and
  - (2) the filtering electrode bears a filtering potential with respect to the specimen mount, the filtering potential being closer to the potential of the specimen mount than to the potential of the local electrode.
2. The atom probe of claim 1 wherein the filtering potential is at least substantially equal to the potential of the specimen mount.
3. The atom probe of claim 1 wherein the filtering potential is intermittently applied to the filtering electrode.

4. The atom probe of claim 1 wherein the filtering electrode is tubular, and has an interior length defined therein oriented along an axis between the specimen mount and the detector, wherein ions traveling between any specimen on the specimen mount and the detector travel through the interior length of the filtering electrode.
5. The atom probe of claim 4 wherein the filtering electrode includes one or more radiating members extending across its interior.
6. The atom probe of claim 1 further comprising an intermediate electrode situated adjacent the filtering electrode between the local electrode and the detector, wherein the intermediate electrode is charged to a potential between that of the local electrode and the detector.
7. The atom probe of claim 1 further comprising an intermediate electrode situated between the filtering electrode and the detector, wherein the intermediate electrode is charged to a potential between that of the filtering electrode and the detector.
8. The atom probe of claim 7 wherein the intermediate electrode is charged to a potential with respect to the specimen mount which is at least as great as the potential of the local electrode with respect to the specimen mount.
9. The atom probe of claim 1 further comprising a tubular intermediate electrode adjacent the filtering electrode, the intermediate electrode having an interior length defined therein oriented along an axis between the specimen mount and the detector, wherein ions traveling between any specimen on the specimen mount and the detector travel through the interior length of the intermediate electrode.

10. The atom probe of claim 1 wherein at least one of the specimen mount and the detector are movable to adjust the distance between the specimen mount and the detector.
11. The atom probe of claim 10 wherein the filtering electrode is repositionable between the specimen mount and the detector.
12. The atom probe of claim 11 further comprising an intermediate electrode situated between the local electrode and the detector.
13. The atom probe of claim 12 wherein the intermediate electrode is also repositionable between the specimen mount and the detector.
14. The atom probe of claim 12 wherein one of the intermediate electrode and the filtering electrode is repositionable to at least partially receive the other therein.
15. The atom probe of claim 10 further comprising an intermediate electrode situated between the local electrode and the detector, wherein the intermediate electrode is repositionable between the specimen mount and the detector.
16. The atom probe of claim 15 wherein one of the intermediate electrode and the filtering electrode is repositionable to at least partially receive the other therein.

17. An atom probe comprising:
  - a. a specimen mount bearing a datum potential;
  - b. a local electrode spaced from the specimen mount, the local electrode bearing an attractive potential with respect to the datum potential whereby any ions from a specimen on the specimen mount are attracted toward the local electrode;
  - c. a detector spaced from the local electrode and the specimen mount, the detector bearing an attractive potential with respect to the datum potential whereby any ions from a specimen on the specimen mount are attracted toward the detector;
  - d. a first intermediate electrode situated between the local electrode and the detector;wherein at least one of the specimen mount and the detector are movable to adjust the distance between the specimen mount and the detector.
18. The atom probe of claim 17 wherein the first intermediate electrode bears a potential adjustable about the potential of the local electrode, whereby the flight path of ions traveling adjacent the first intermediate electrode and between the local electrode and the detector may be adjusted.
19. The atom probe of claim 17 wherein the first intermediate electrode is a filtering electrode bearing a filtering potential which is:
  - a. between the datum potential and the potential of the local electrode, and
  - b. closer to the datum potential than to the potential of the local electrode.
20. The atom probe of claim 17 wherein the filtering potential is at least substantially equal to the datum potential.

21. The atom probe of claim 17 wherein the filtering potential is intermittently applied to the first intermediate electrode.
22. The atom probe of claim 17 wherein the first intermediate electrode has an interior passage with a length extending between the local electrode and the detector.
23. The atom probe of claim 22 wherein the intermediate electrode includes one or more radiating members extending across its interior passage.
24. The atom probe of claim 17 further comprising a second intermediate electrode situated between the local electrode and the detector, wherein the second intermediate electrode bears a potential between that of the filtering electrode and the detector.
25. The atom probe of claim 24 wherein one of the first intermediate electrode and the second intermediate electrode is repositionable to at least partially receive the other therein.
26. The atom probe of claim 17 wherein the intermediate electrode is repositionable between the specimen mount and the detector.

27. An atom probe comprising:
- a. a specimen mount bearing a datum potential;
  - b. a detector spaced from the specimen mount;
  - c. a local electrode between the specimen mount and the detector;
  - d. an intermediate electrode situated between the local electrode and the detector;
  - e. a filtering electrode situated between the local electrode and the detector;
- wherein:
- (1) the local electrode, intermediate electrode, and filtering electrode are located along an ion flight path between the specimen mount and the detector;
  - (2) at least one of the specimen mount, the detector, the local electrode, the intermediate electrode, and the filtering electrode are movable along the flight path;
  - (3) the detector, local electrode, and intermediate electrode each bear an attractive potential with respect to the datum potential, thereby attracting any ions from a specimen on the specimen mount; and
  - (4) the filtering electrode bears a filtering potential closer to the potential of the specimen mount than to the potential of the local electrode.
28. The atom probe of claim 27 wherein one of the intermediate electrode and the filtering electrode is repositionable to at least partially receive the other therein.
29. The atom probe of claim 27 wherein at least one of the intermediate electrode and the filtering electrode is tubular, and includes an interior passage having a length oriented along the ion flight path.

30. The atom probe of claim 27 wherein at least one of the intermediate electrode and the filtering electrode includes:
- a. an interior passage oriented along the ion flight path, and
  - b. includes one or more radiating members extending across its interior passage.